



2014 MARITIMES WINTER RESEARCH VESSEL SURVEY TRENDS ON GEORGES BANK

Context

Fisheries and Oceans Canada (DFO) has conducted winter research vessel (RV) surveys in the Maritimes Region, Northwest Atlantic Fisheries Organization (NAFO) Area 5Z (Georges Bank; Figure 1) using a standardized protocol since 1987. Results from these surveys provide information on trends in abundance for groundfish species in the Maritimes Region. While these data reflect trends in biomass and abundance and are a critical part of science-based stock assessments, a full assessment, including other sources of data, would be required to evaluate the impacts of management measures on population status. Fisheries and Aquaculture Management (FAM) requested a review of the DFO Winter RV Survey information on the following species in 5Z1-5Z4 (Figure 2) from the 2014 Winter RV Survey on Georges Bank: Cod, Haddock, Pollock, White Hake, Yellowtail Flounder, Smooth Skate, Thorny Skate, Barndoor Skate, Winter Skate, and Little Skate. The survey information will be used by FAM as background for discussions with various industry stakeholders on recommendations for management measures, and to determine which stocks should be reviewed in more detail in 2015.

This Science Response Report results from the Response Process of 16 June, 2014, on the Maritimes Research Vessel Survey Trends on Georges Bank.

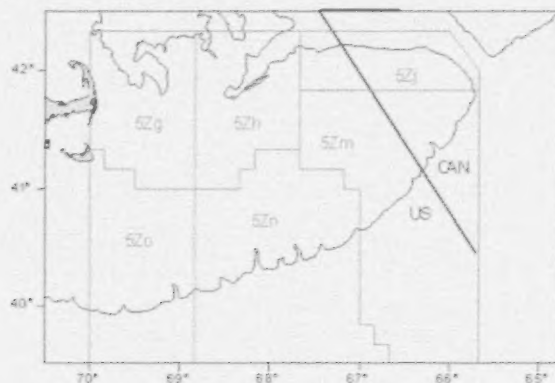


Figure 1: Northwest Atlantic Fisheries Organization (NAFO) Unit Areas.

Background

The Georges Bank (5Z) Winter RV Survey has been conducted annually using a standard stratification since 1987. The survey follows a stratified random sampling design, and it includes sampling of fish and invertebrates using a bottom otter trawl. These surveys are the primary data source for monitoring trends in species distribution, abundance, and biological condition on Georges Bank (for details see Stone and Gross 2012).

The bottom trawl surveys were designed to provide abundance trends for fish and invertebrates between depths of about 30 m and 200 m. Survey indices are expected to be proportional to abundance for most species.

Strata boundaries are shown in Figure 2 for the 5Z area. Sampling was conducted in all strata in 2014, but the eastern end of the 5Z5-5Z7 strata were dropped due to lack of time. Catch distribution plots for the area sampled are provided for the suite of species requested.



Figure 2: Georges Bank (5Z) Winter RV Survey strata.

Analysis

The time-series of survey biomass indices (not total biomass) are compared to averages for a series of time periods to provide historical context for biomass levels. The time periods used are a short-term 5 year average (2009 - 2013) and the long-term survey average (1987-2013). Information on calculation of these indices is contained in Stone and Gross (2012).

Biomass index trends are shown for 5Z1-5Z4 only. Comparisons of 2013 and 2014 length frequencies from the survey catch to the long-term median or mean (1987-2012) are also included for the selected stocks. Comparisons with the median are used to lessen the impact of high values in one year, which can result in all other years being below average. Comparisons to the mean are used for species where the numbers caught are so low that the median number at length is often zero.

Atlantic Cod

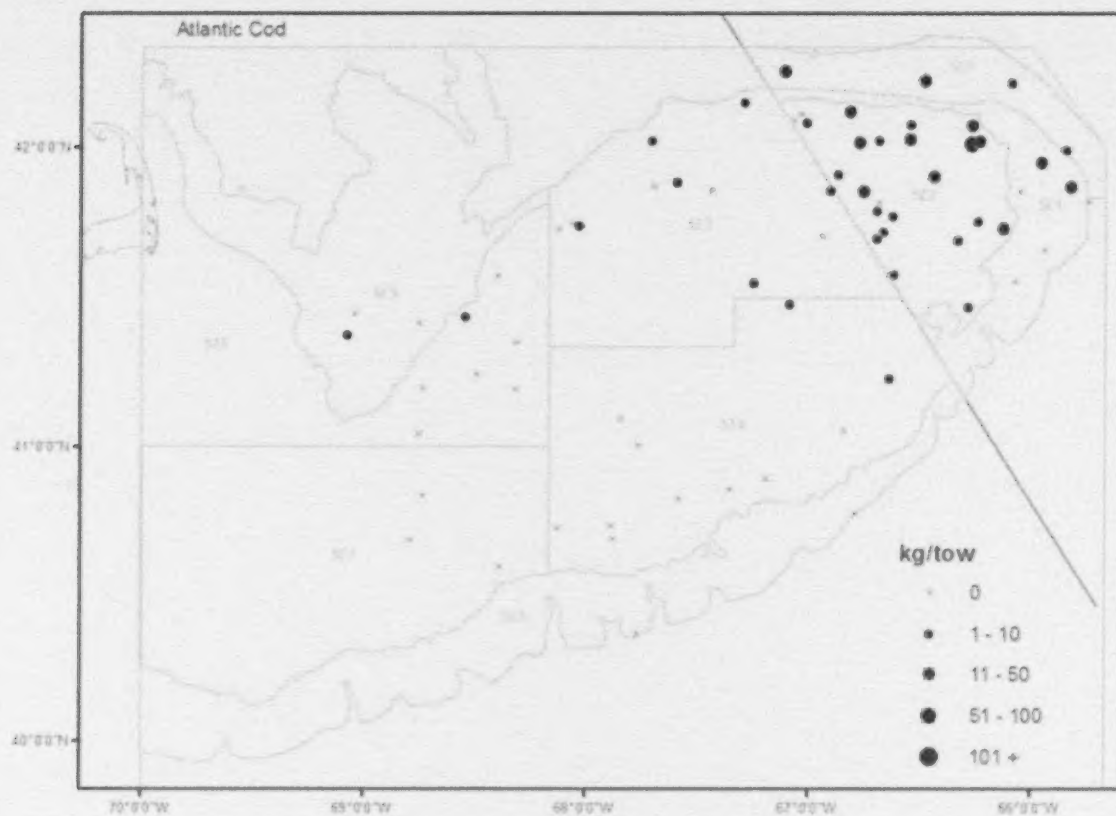


Figure 3a: Distribution of Atlantic Cod catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

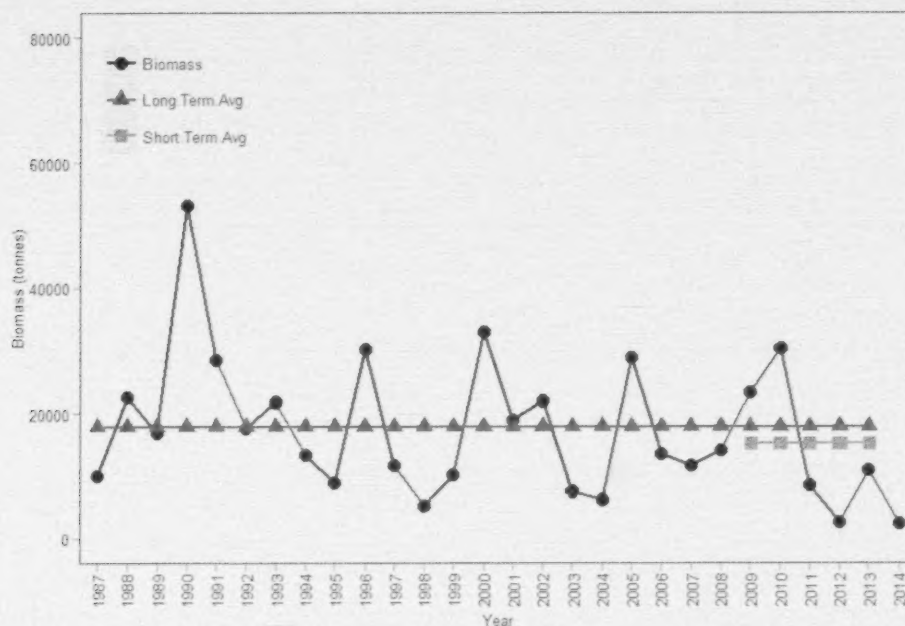


Figure 3b: Biomass index for Atlantic Cod in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

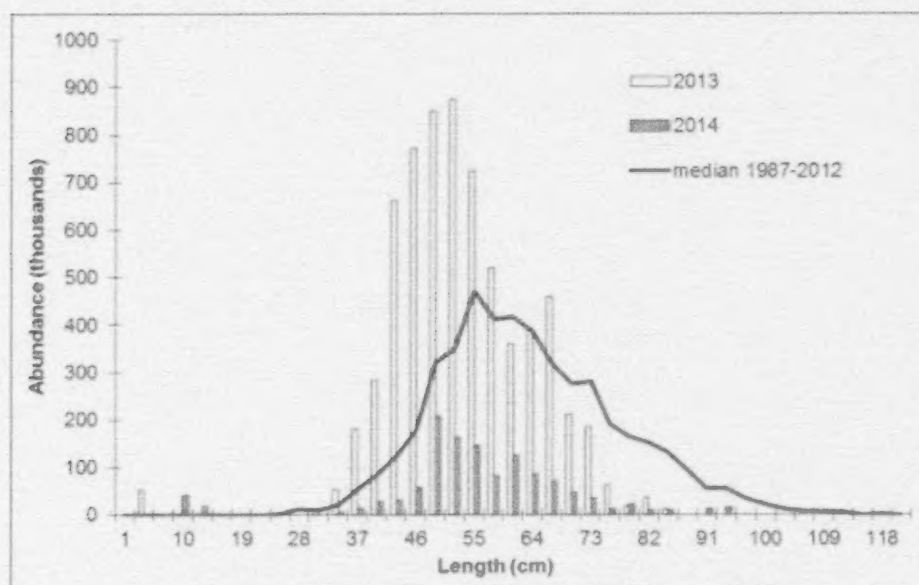


Figure 3c: Length frequency indices for Atlantic Cod in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2012.

Haddock

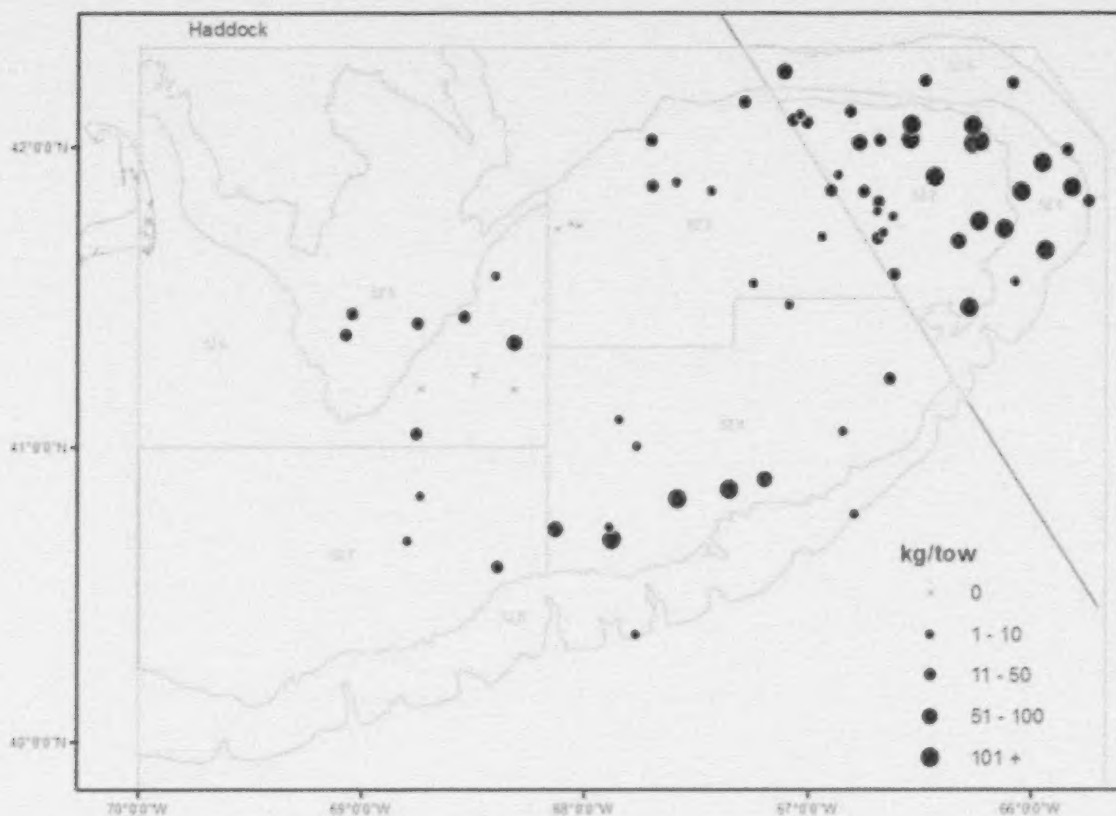


Figure 4a: Distribution of Haddock catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

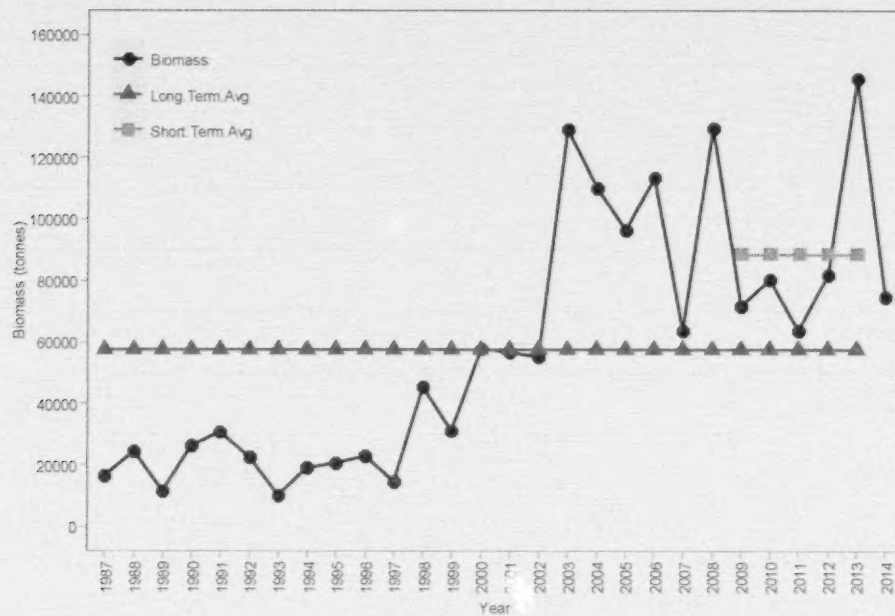


Figure 4b: Biomass index for Haddock in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

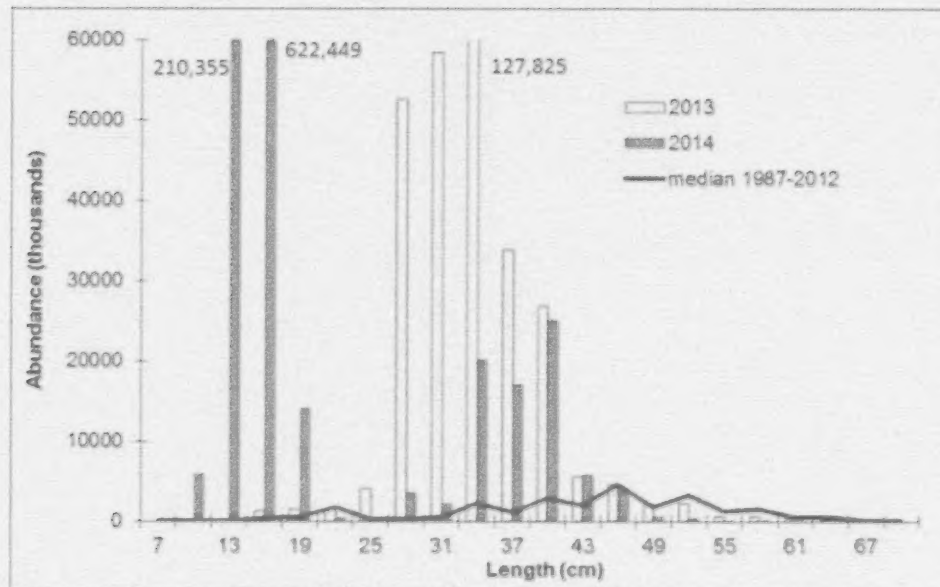


Figure 4c: Length frequency indices for Haddock in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2012.

Pollock

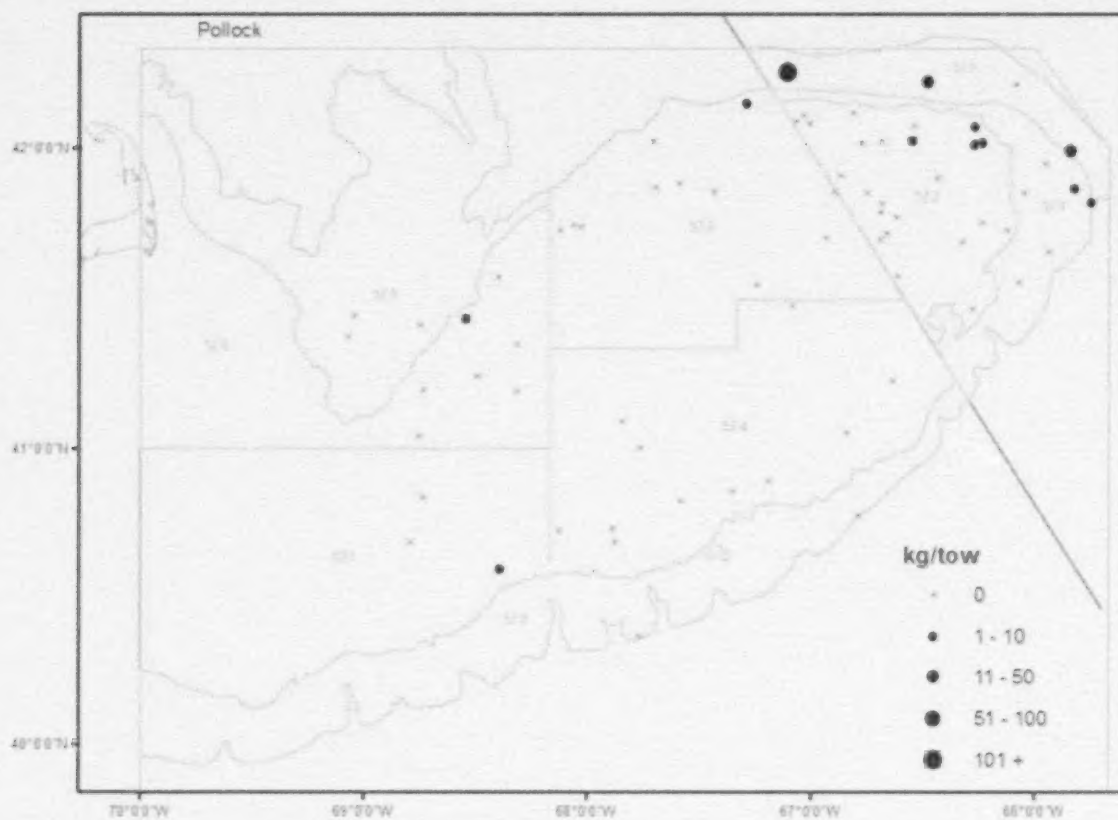


Figure 5a: Distribution of Pollock catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

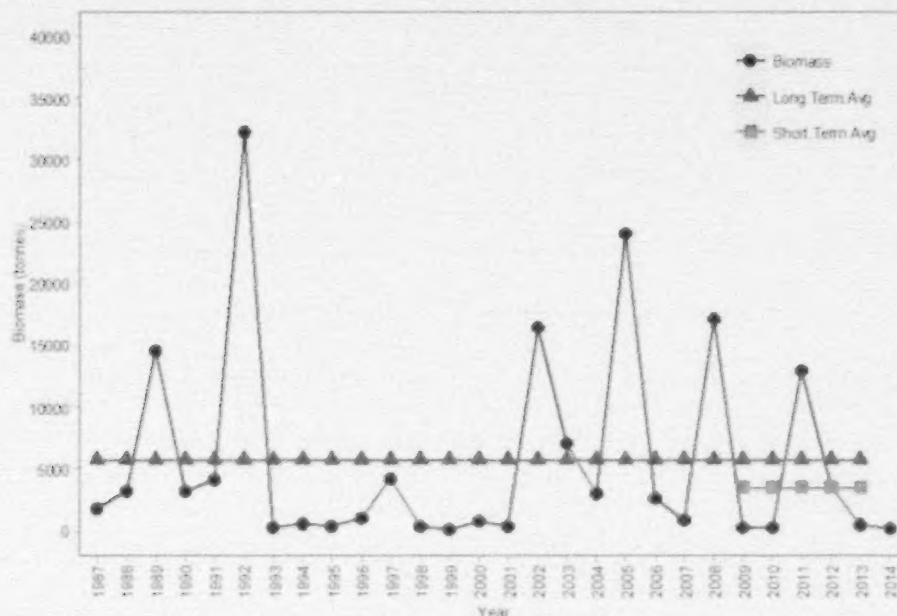


Figure 5b: Biomass index for Pollock in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

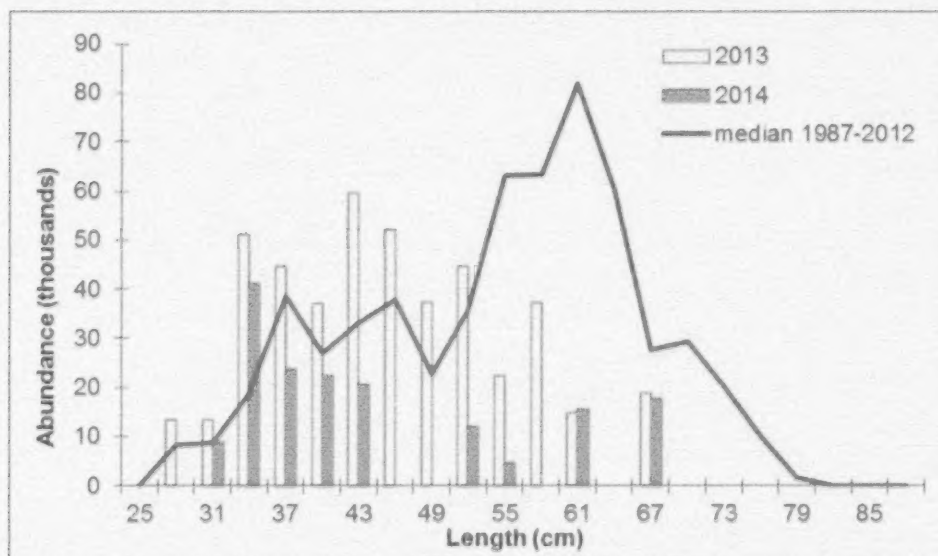


Figure 5c: Length frequency indices for Pollock in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2012.

White Hake

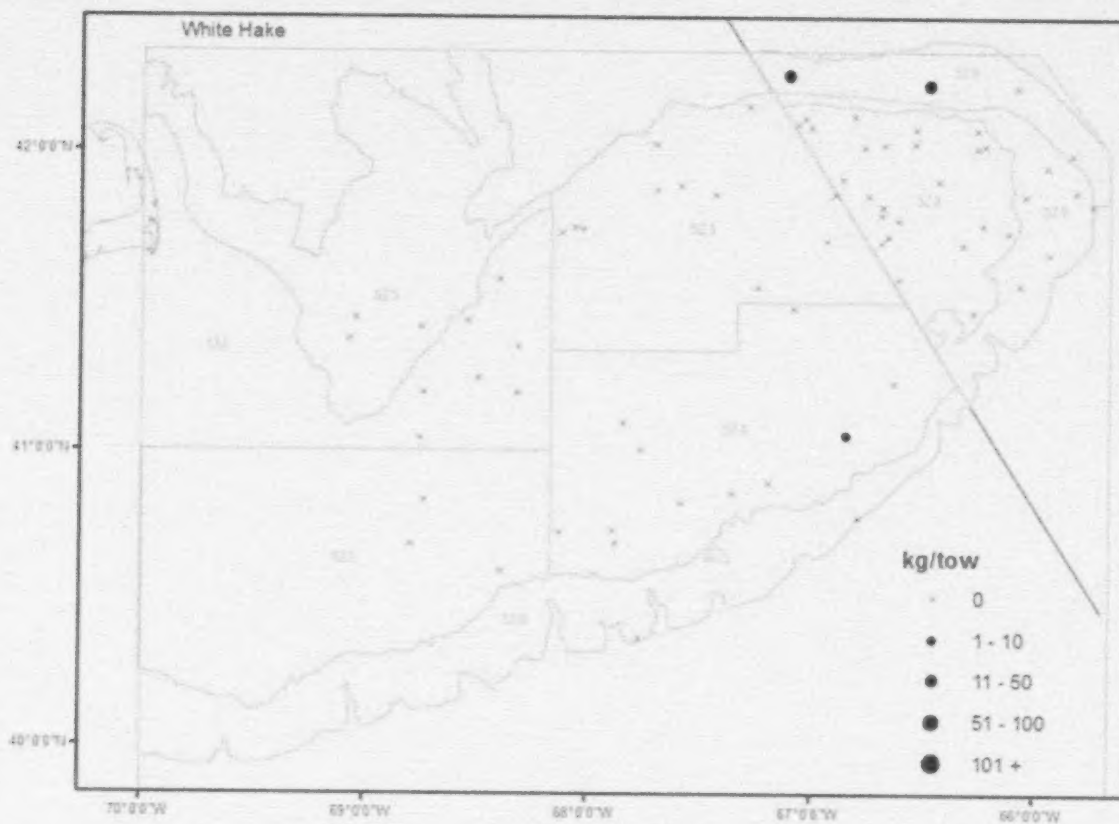


Figure 6a: Distribution of White Hake catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

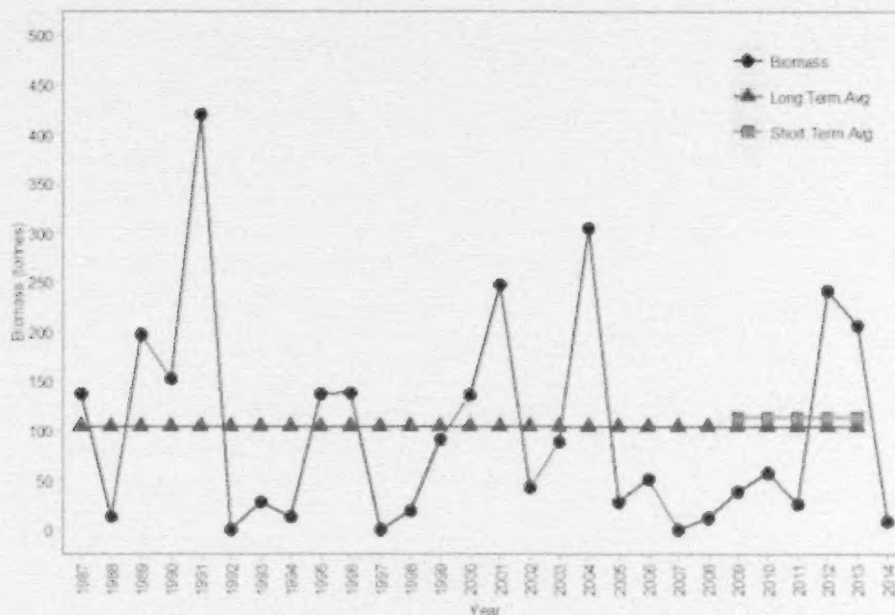


Figure 6b: Biomass index for White Hake in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

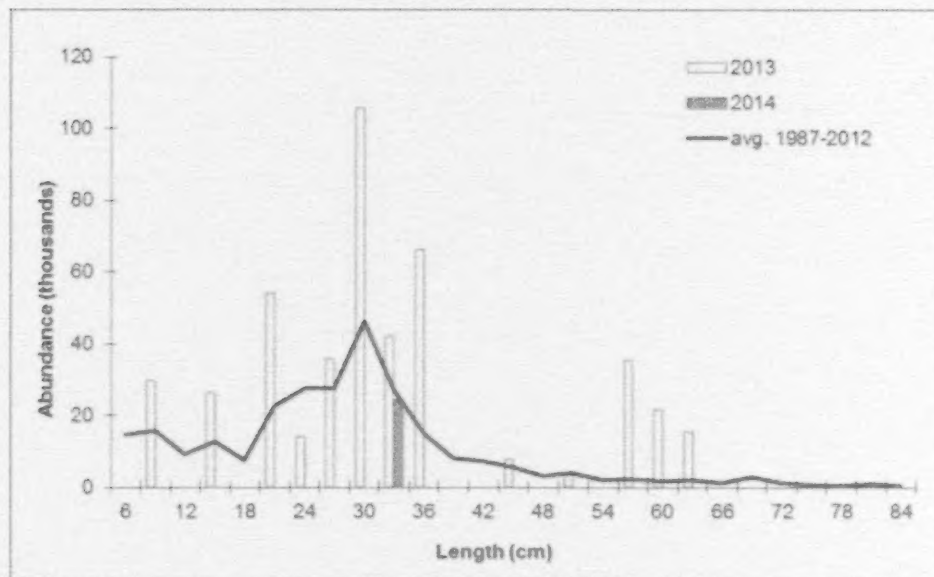


Figure 6c: Length frequency indices for White Hake in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2012.

Yellowtail Flounder

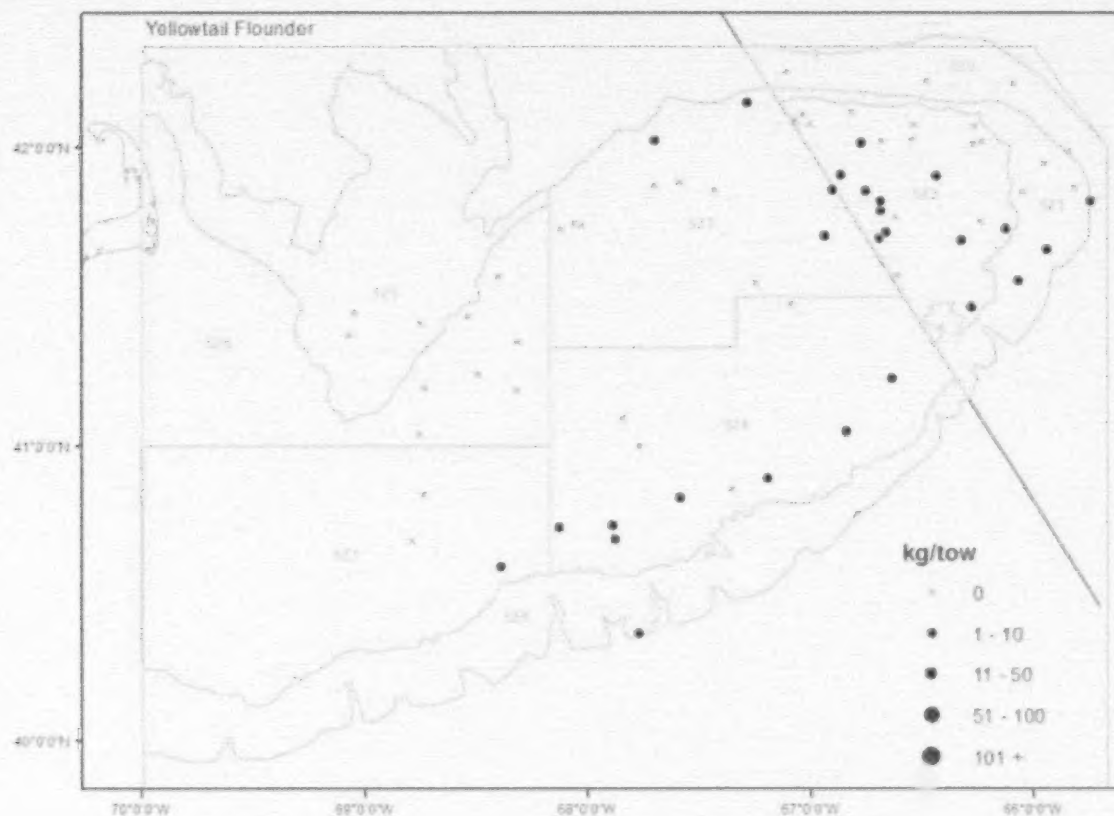


Figure 7a: Distribution of Yellowtail Flounder catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

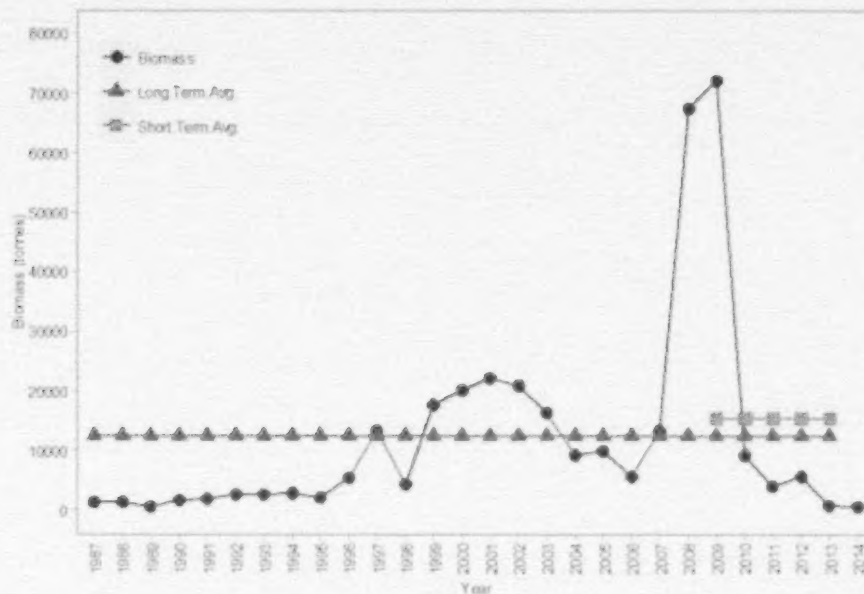


Figure 7b: Biomass index for Yellowtail Flounder in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

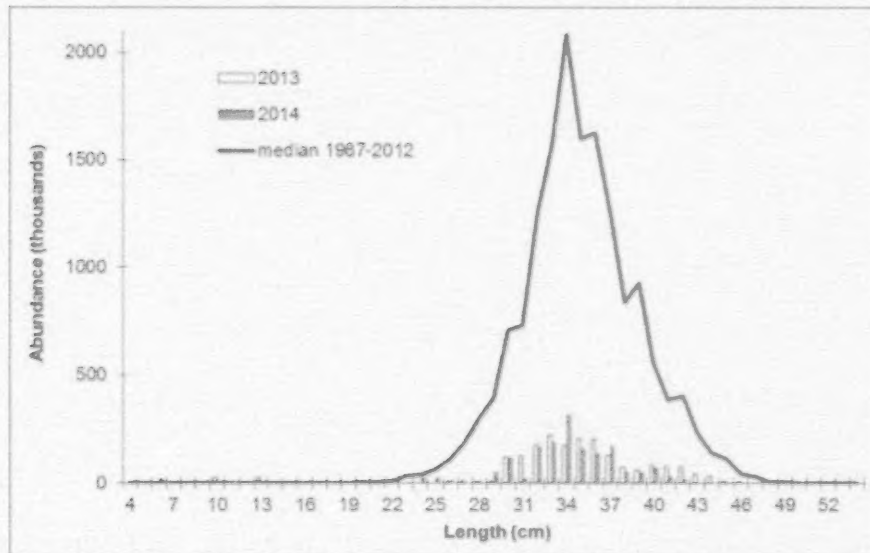


Figure 7c: Length frequency indices for Yellowtail Flounder in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2012.

Smooth Skate

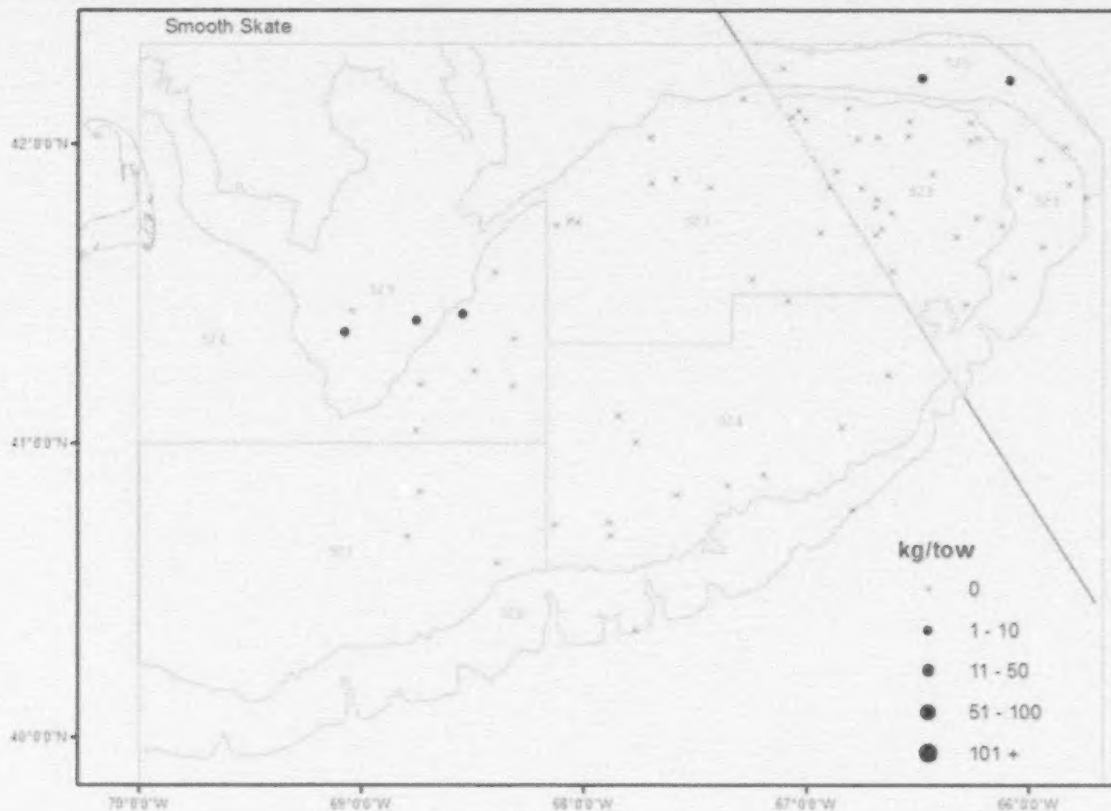


Figure 8a: Distribution of Smooth Skate catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size. Note: No Smooth Skate were caught in strata 5Z1-5Z4 during the 2014 Winter RV Survey.

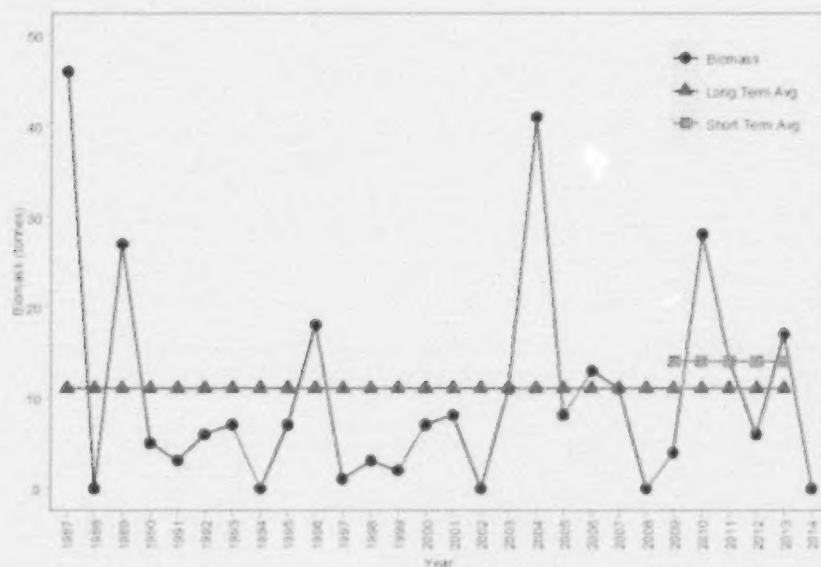


Figure 8b: Biomass index for Smooth Skate in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013). Note: No Smooth Skate were caught in strata 5Z1-5Z4 during the 2014 Winter RV Survey.

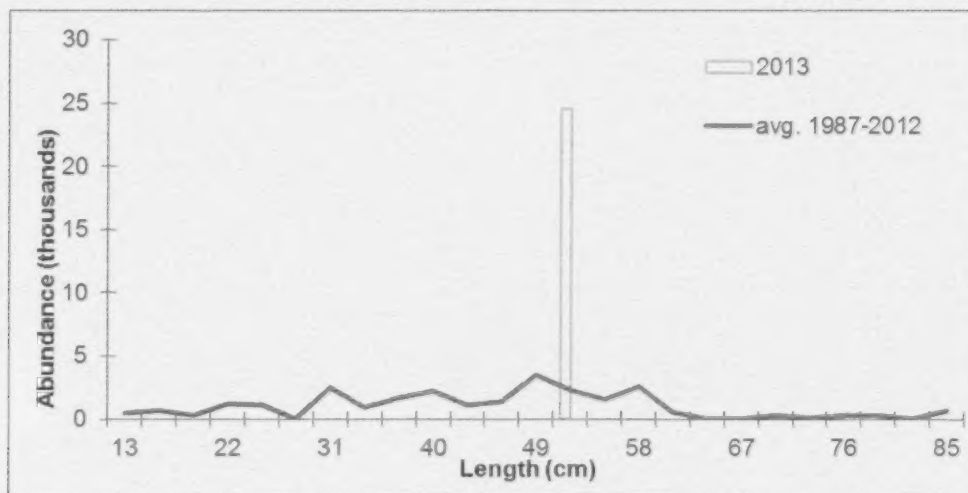


Figure 8c: Length frequency indices for Smooth Skate in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2012. Note: No Smooth Skate were caught in strata 5Z1-5Z4 during the 2014 Winter RV Survey.

Thorny Skate

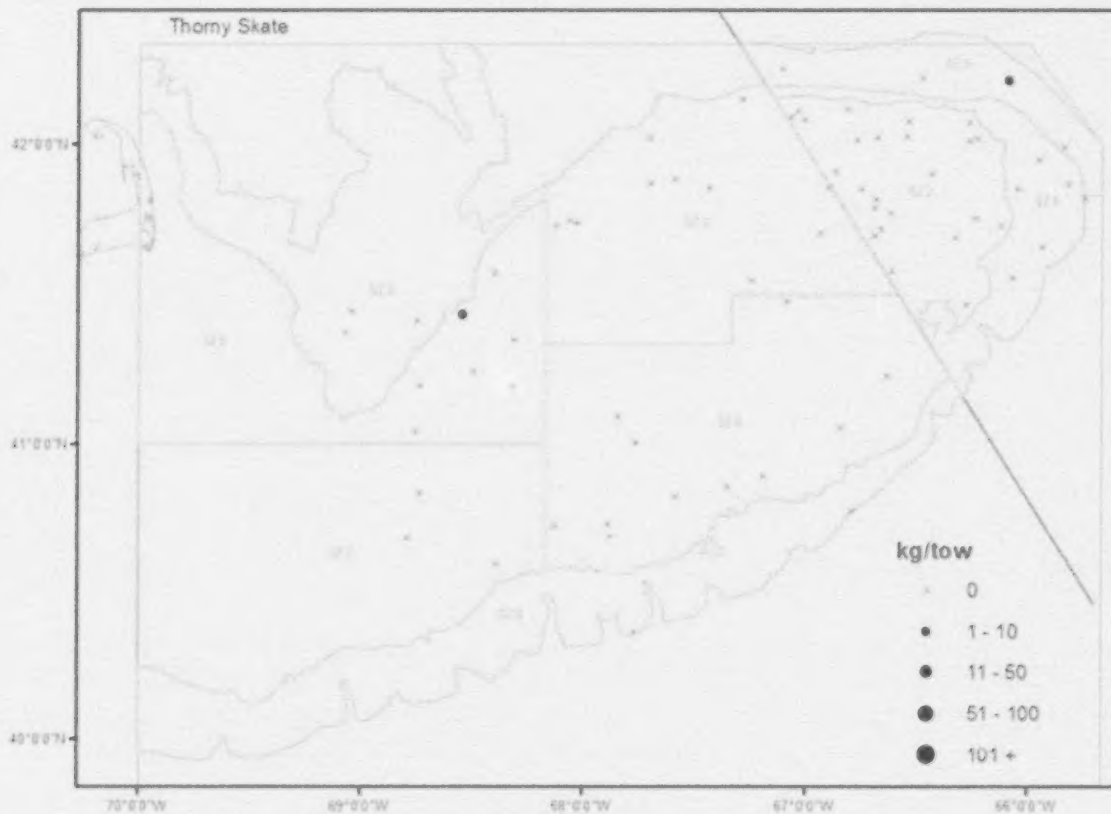


Figure 9a: Distribution of Thorny Skate catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size. Note: No Thorny Skate were caught in strata 521-524 during the 2014 Winter RV Survey.

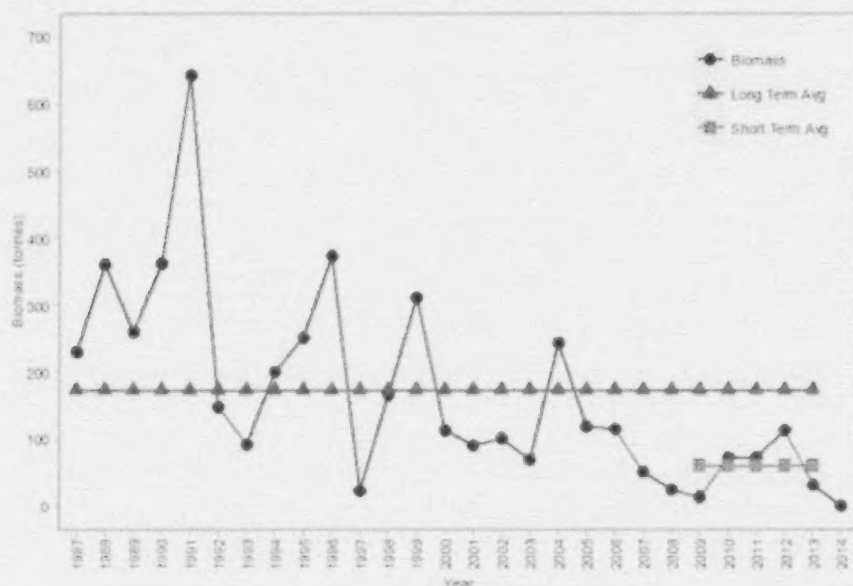


Figure 9b: Biomass index for Thorny Skate in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013). Note: No Thorny Skate were caught in strata 5Z1-5Z4 during the 2014 Winter RV Survey.

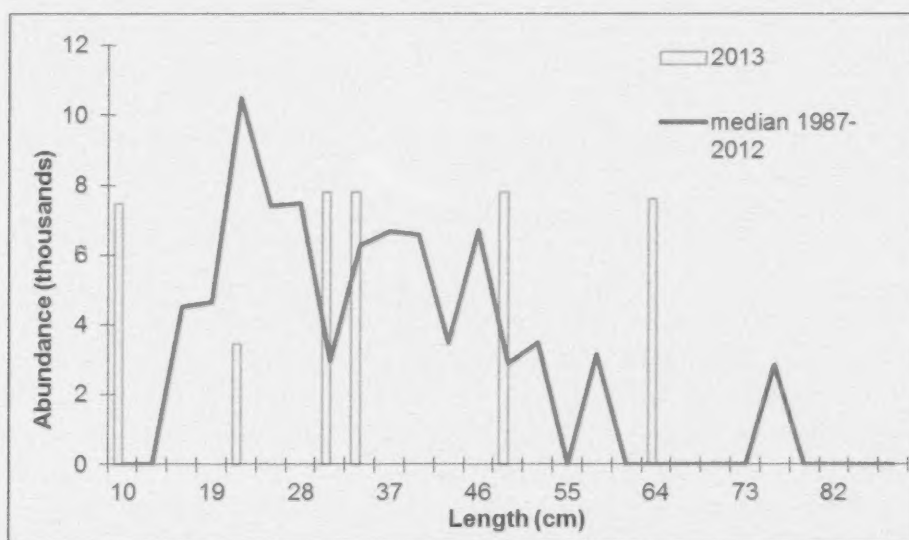


Figure 9c: Length frequency indices for Thorny Skate in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2012. Note: No Thorny Skate were caught in strata 5Z1-5Z4 during the 2014 Winter RV Survey.

Barndoor Skate

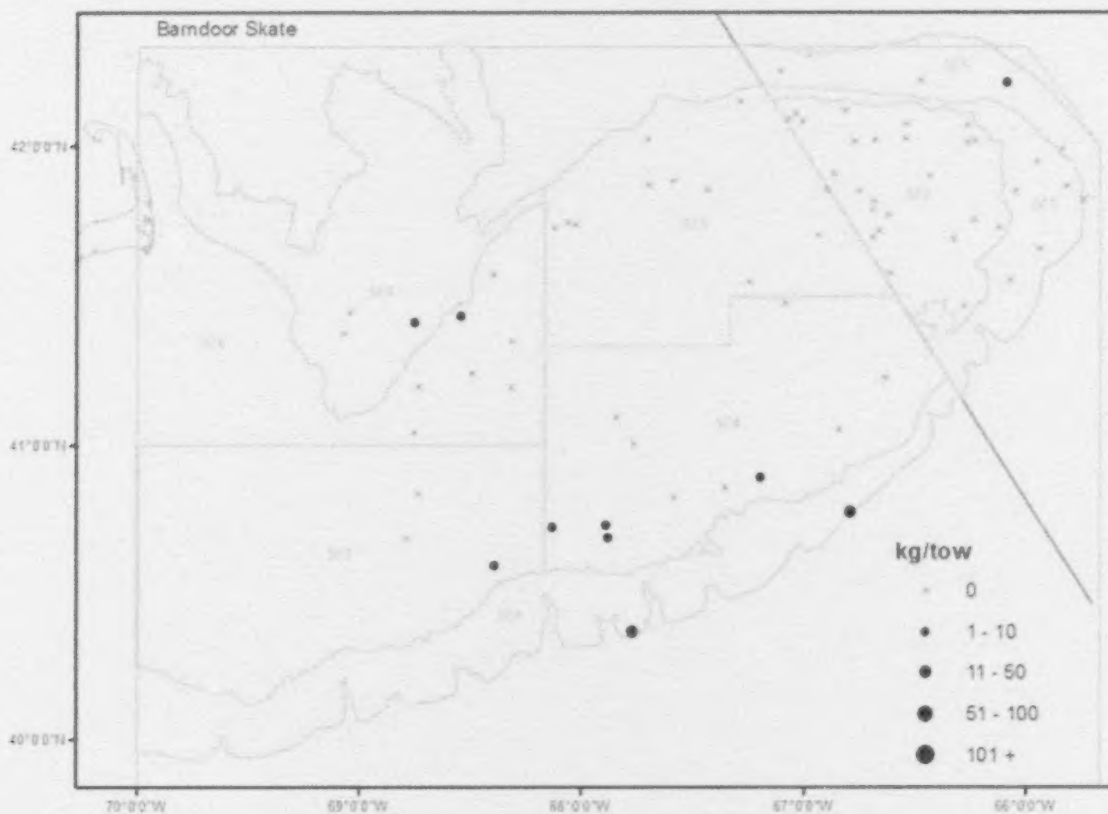


Figure 10a: Distribution of Barndoor Skate catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

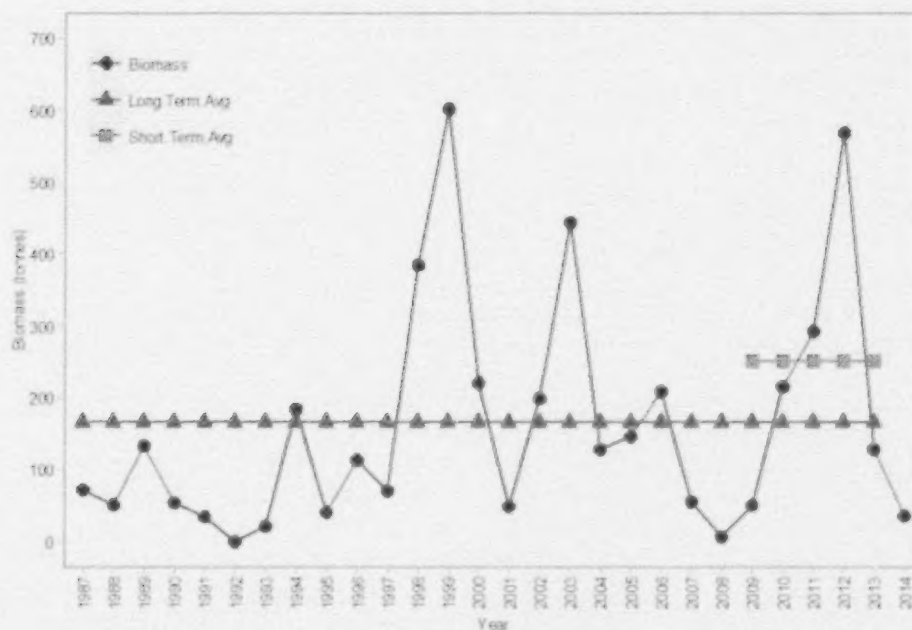


Figure 10b: Biomass index for Barndoor Skate in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

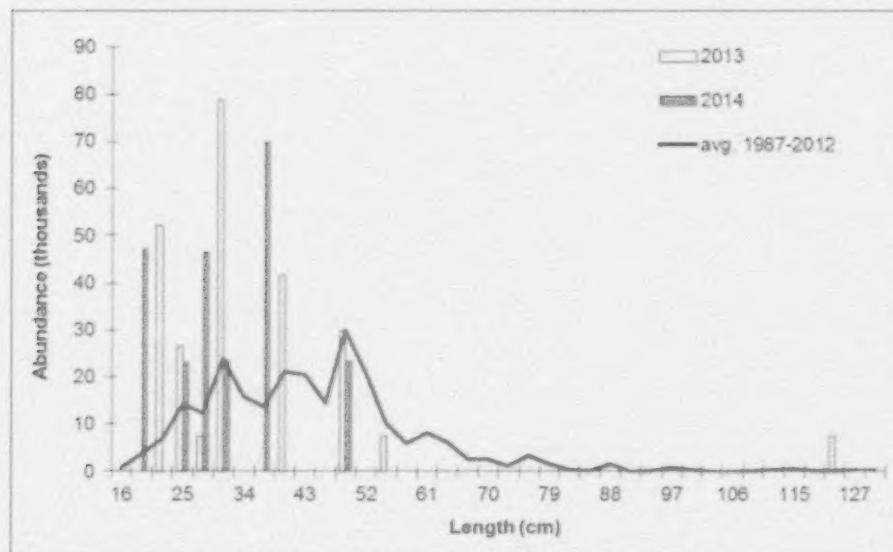


Figure 10c: Length frequency indices for Barndoor Skate in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the average number in thousands at length for the time period 1987-2012.

Winter Skate

Winter Skate and **Little Skate** cannot be reliably distinguished at lengths less than about 40 cm. Given that the majority of the winter and little skates captured in the surveys are in this length range, the biomass trends are influenced by the contribution of fish for which identification is uncertain (for more information see McEachran and Musick 1973).

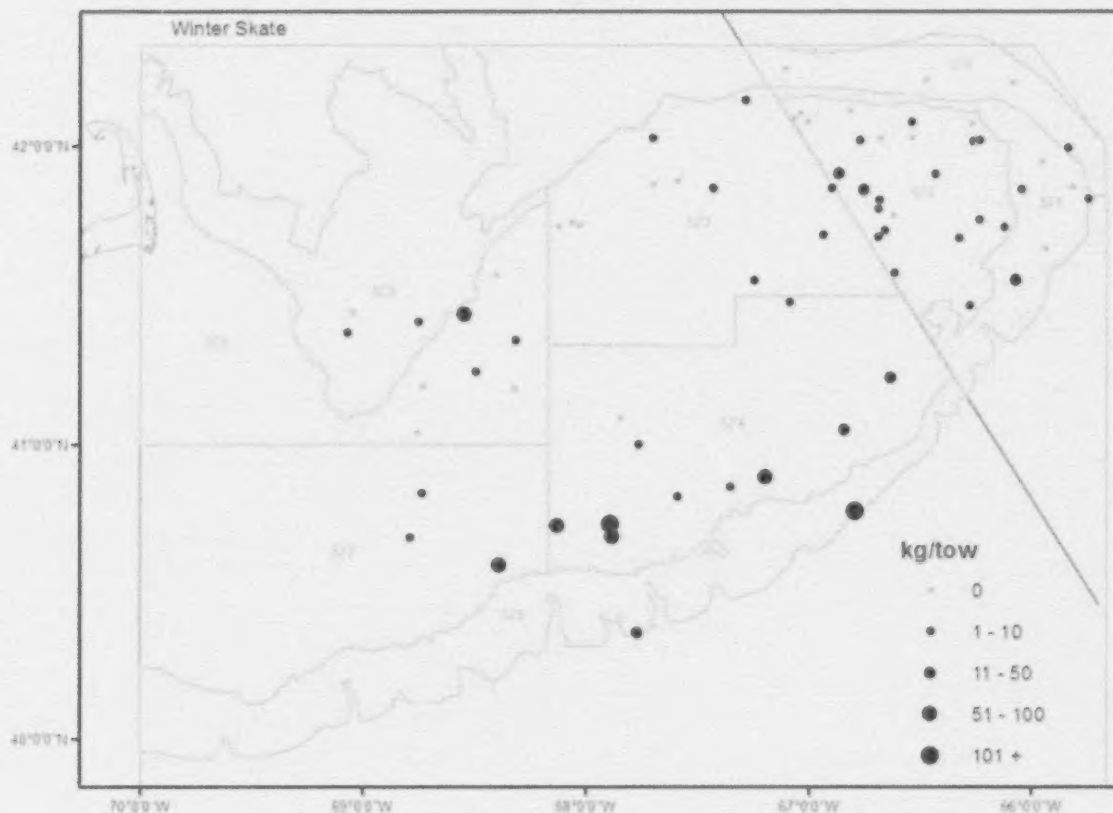


Figure 11a: Distribution of Winter Skate catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

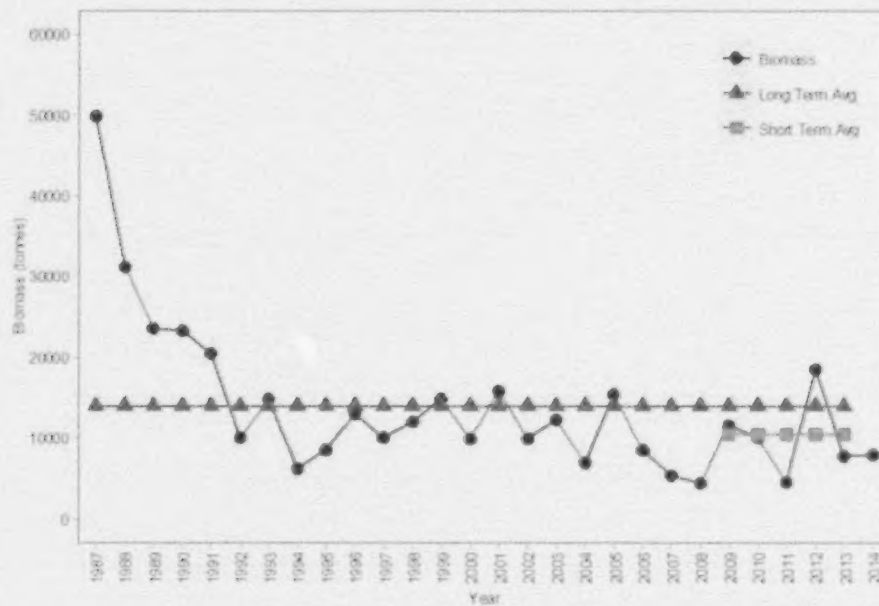


Figure 11b: Biomass index for Winter Skate in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

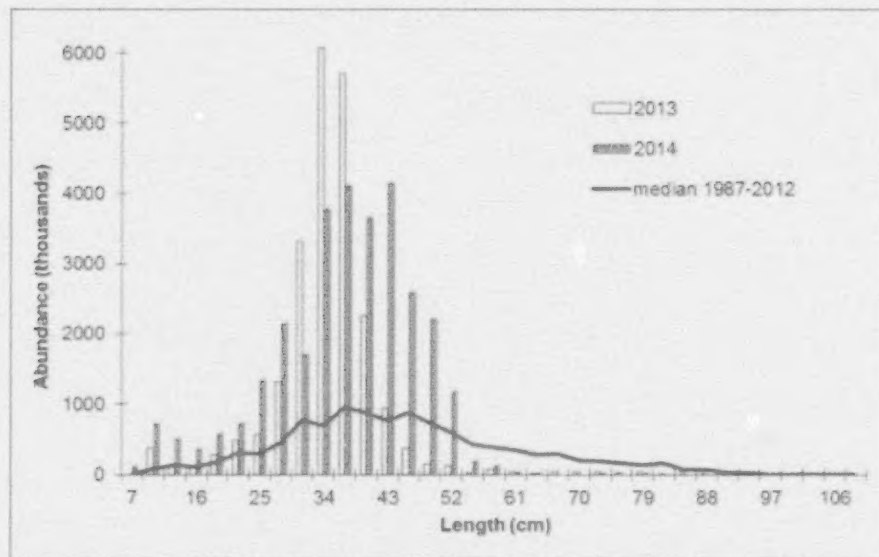


Figure 11c: Length frequency indices for Winter Skate in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2013.

Little Skate

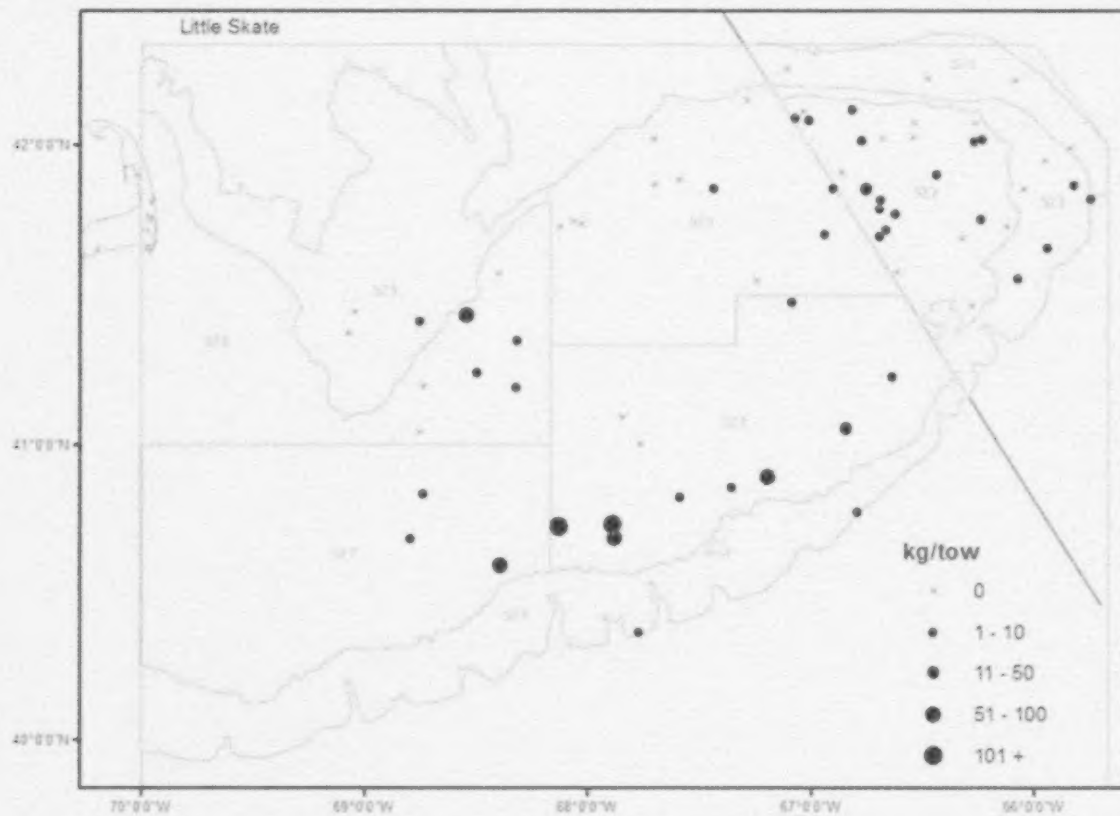


Figure 12a: Distribution of Little Skate catches during the 2014 Winter RV Survey. Zero catch is represented by the x symbol. Black circles represent catches. The circle area is proportional to the catch size.

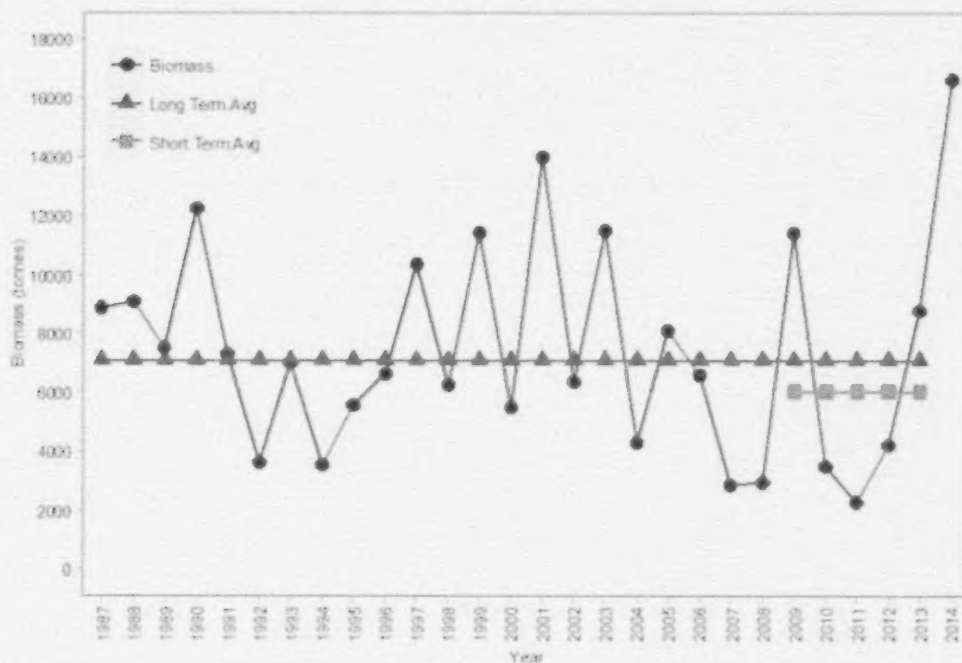


Figure 12b: Biomass index for Little Skate in strata 5Z1-5Z4 from the Winter RV Survey represented by the solid black line. The blue line with the blue squares represents the long-term survey average (1987-2013). The red line with the red diamonds represents the short-term 5 year average (2009-2013).

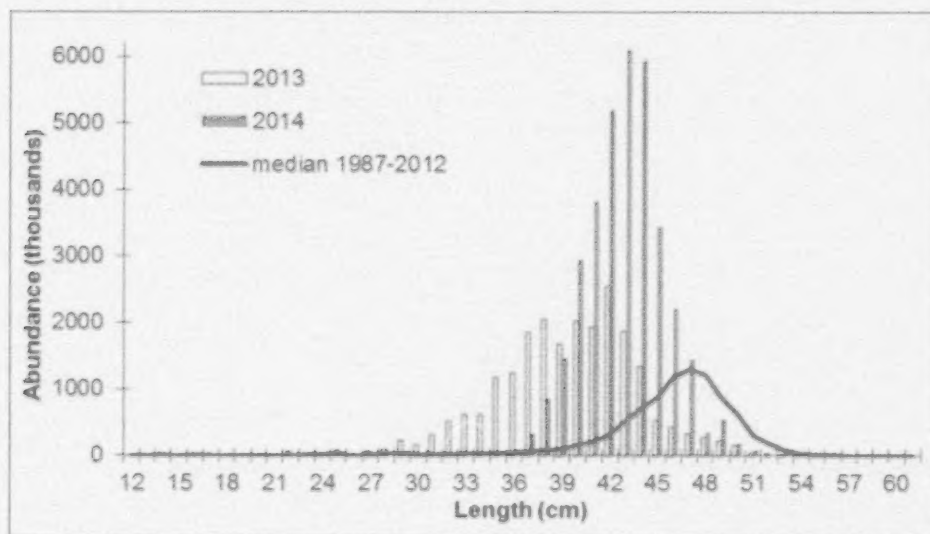


Figure 12c: Length frequency indices for Little Skate in strata 5Z1-5Z4 from the Winter RV Survey. The solid red bars represent the number in thousands at length from the 2014 survey. The open green bars represent the number in thousands at length from the 2013 survey. The solid blue line represents the median in thousands at length for the time period 1987-2012.

Conclusions

Biomass indices from strata 5Z1-5Z4 from the 2014 Winter RV Survey on Georges Bank were below the short term (1987-2013) and long term (1987-2013) average biomass for all species reviewed in this report, with the exception of Haddock and Little Skate. The 2014 biomass index for Little Skate was above both the long term and short term average biomass. The 2014 biomass index for Haddock was above the long term average, but below the short term average biomass.

Contributors

| | |
|-----------------------|-----------------------------------------------------|
| Donald Clark (Lead) | DFO Science, Maritimes |
| Tara McIntyre (Lead) | DFO Science, Maritimes |
| Lottie Bennett | DFO Science, Maritimes |
| Manon Cassista-Da Ros | DFO Science, Maritimes |
| Jamie Emberley | DFO Science, Maritimes |
| Carl MacDonald | DFO Fisheries and Aquaculture Management, Maritimes |
| Mike McMahon | DFO Science, Maritimes |
| Tana Worcester | DFO Science, Maritimes |

Approved by

Alain Vézina
Regional Director of Science, DFO Maritimes Region
Dartmouth, Nova Scotia
Ph. 902-426-3490
DATE: August 5, 2014

Sources of Information

- McEachran, J.D., and J.A. Musick. 1973. Characters for distinguishing between immature specimens of the sibling species, *Raja erinacea* and *Raja ocellata* (Pisces: Rajidae). *Copeia* 1973: 238-250.
- Stone, H.H., and W.E. Gross. 2012. Review of the Georges Bank Research Vessel Survey Program, 1987-2011. *Can. Manuscr. Rep. Fish. Aquat. Sci.* 2988: xiii + 95p.

This Report is Available from the:

Center for Science Advice (CSA)
Maritimes Region
Fisheries and Oceans Canada
PO Box 1006, Station B203
Dartmouth, Nova Scotia
Canada B2Y 4A2

Telephone: 902-426-7070

E-Mail: XMARMRAP@dfo-mpo.gc.ca

Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3769

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Correct Citation for this Publication:

DFO. 2014. 2014 Maritimes Winter Research Vessel Survey Trends on Georges Bank. DFO
Can. Sci. Advis. Sec. Sci. Resp. 2014/045.

Aussi disponible en français:

MPO. 2014. *Tendances dans les relevés d'hiver 2014 par navire scientifique dans la région des
Maritimes – banc Georges. Secr. can. de consult. sci. du MPO, Rép. des Sci. 2014/045.*